

# CALIFORNIA PITCH CANKER TASK FORCE

## Swanton Pacific Ranch

April 3, 2006

Richard Hawley, Greenspace – The Cambria Land Trust  
Don Canestro – U.C. Ken Norris Reserve  
Tom Smith – CDF  
Karen Wells – Cal Poly  
James Allison – FHP  
Wally Mark – Cal Poly  
Paul Stover – USFS-R5  
Det Vogler – USFS – PS – DEF  
Steve Staub – DMFF  
Susan Frankel – USFS  
David Yun – Cal Poly  
Doug Piirto – Cal Poly  
Karen Ferlito – Monterey Pine Forest Watch  
Nathan Smith – Cal Poly  
Amy Jirka – Cal Poly  
Jason Pinkerton – Cal Poly  
Tom Blush – USDA Forest Service  
Bill Werner – C.A.N.G.C.  
Glenn Flamik – CDF  
Tom Gordon – U.C. Davis  
Kathleen Farley – The Nature Conservancy  
Deborah Parker – Greenspace – The Cambria Land Trust

The meeting was called to order at 9:40 a.m. by Chairman Steve Staub.

### **Introductions**

Each participant at the meeting introduced themselves.

### **Minutes**

**Wally Mark moved that the minutes of the last meeting be approved as edited. Bill Werner seconded the motion, which was unanimously approved.**

### **Treasurer's Report**

Treasurer Wally Mark reported that there had not been a lot of activity in the Pitch Canker Task Force's bank accounts for the past year. There were two checks written to Greenspace – The Cambria Land Trust for administration of the Task Force. The remainder of the activity consisted of dividends on the account. Dr. Mark stated that the Task Force might consider

moving the bulk of the balance into a savings account or a certificate of deposit, because the account the money is in does really make much interest.

**Doug Piirto moved that some of the funds in the Pitch Canker Task Force account be placed into another account in the same institution and that only working capital be kept in the checking account. Karen Ferlito seconded the motion.**

There was a discussion regarding the amount that should be transferred into the new account. Chairman Staub stated that he felt about 2/3 of the account should be transferred. Dr. Mark stated that there will probably be only one expenditure for the new year, and that would be for administration.

**The motion was amended to state that \$5,000.00 should be kept in the Pitch Canker Task Force checking account for operating expenses and the remainder should be invested in a higher interest bearing account. The motion passed unanimously.**

### **Pitch Canker Status Updates**

#### **The Pitch Canker Fungus in the Central Sierra Nevada**, Presented by Det Vogler

Dr. Det Volger presented the history of the pitch canker find in Douglas fir. He stated that a Douglas fir scion was sent to New Zealand and put under high quarantine restrictions. All material that went there was grafted within the containment and observed for six months. Through DNA analysis in New Zealand, in November of 2003 the Douglas fir was found to have pitch canker. The pitch canker was recovered from one symptomatic Douglas fir branch at Badger Hill, which was collected in November of 2003. There were four asymptomatic Douglas fir branches confirmed with pitch canker that were collected in February of 2004. Over the next two years, 1137 samples were taken, including previously shipped scion wood, and 10,457 petri dishes were examined from Badger Hill and elsewhere in California. The results determined that there were no further finds of *F. circinatum*.

Dr. Volger noted that Badger Hill is a managed forest with beautiful trees. It is also a spot where a lot of people, trucks, material and air travel through. Pitch canker was found in Badger Hill four times in 2003 and 2004, but nothing has been found since. It has also been determined at the sites where the material had been sent – all the trees are clean.

Dr. Volger showed a view of the orchard demonstrating that the trees were arranged far from each other in the orchard. Two of the trees were destroyed. Over 500 trees have been sampled, including the trees all around the destroyed trees. Only 20 trees have not been sampled. This orchard used to be a Monterey knobcone breeding orchard and they have been planted back in. They are growing well and will serve as canaries.

In November of 2005 a tree was discovered that was covered with pitch. Samples were taken from the tree. But the results of the tests were negative. The pitch reaction was probably due to hormonal injections used to enhance cone formation. All the foliar samples were asymptomatic, all the cones were asymptomatic and all the seeds were asymptomatic.

Dr. Volger presented a number of slides which demonstrated how tests were done with different enzymes and DNA sequencing. Dr. Volger noted that some phylogenically related groups of isolates kept showing up again and again, that they were all found commonly in every trial that was done. They are close to other *fusarium*, but it is not known if they are pathogenic. All they know is that they are there.

Dr. Volger acknowledged all the work done by the people in New Zealand and all the people who helped with the project. He informed the Task Force that, after these findings, it has been decided that operations will resume at Badger Hill, but that he will remain in close contact with the project and will monitor the Monterey knobcone twice per year. He would welcome the Task Force's suggestions on how to proceed.

Dr. Tom Gordon asked if there has been insect sampling. Dr. Volger noted that insect traps have been put up around Badger Hill, but that there have been no positive results. Richard Hawley noted that at the last meeting there was some talk about this transportation corridor and about the fog coming up through the pass that could conceivably be carrying spores. Dr. Volger said that it usually all comes from the southwest storms. The wet environment coming in from the coast brings everything with it, but there are many questions that cannot be answered in that regard.

Dr. Frankel noted that New Zealand originally discovered pitch canker with PCR and that they are the leader in its use as a diagnostic tool. It has not been found by them in an orchard and in a forest. This says a lot for the power of PCR. Dr. Volger stated that the challenge is to use PCR to look at the microflora to know what is out there. Pathogens can arrive and have nothing to be pathogenic on.

Nathan Smith asked why some of the trees were killed and they left others. Dr. Volger stated that both of the trees were donors of scion wood to New Zealand. At that time it seemed as if it was important to act right away. After February, they decided that, if they destroyed all the trees that they found pitch canker on, they couldn't determine if an establishment was forming. So they decided to just continue to monitor it, and they have continued to monitor it. No material has been shipped out of Badger Hill from February 2004 to December 2005.

Chairman Staub noted that, when it first came up, there was a discussion of the surrounding areas. He asked if there had been any reports on symptoms in the surrounding areas. Dr. Volger noted that they can't approach the Christmas tree growers. The source is not in Forest Service areas. Dr. Volger confirmed that the Christmas tree growers are growing firs of some kind. Mr. Hawley said that Bill Libby predicted that Douglas fir would be a latent carrier of pitch canker. Dr. Volger stated that it could be, but Dr. Gordon walked every row of the orchard and took eight samples of branch. They also took foliar washes and found it in the washes. He admitted that it is a possibility, but they don't know how to address it. He did not think that inoculations could be justified. Mr. Hawley noted that the PCR technique would be a perfect technique. Dr. Volger agreed and stated would possibly be less expensive than plantings; but, unfortunately, they don't have the funding to do that right now.

## Cal Poly Presentations

### Monitoring Pine Pitch Canker with GIS presented by David I Yun.

Mr. Yun noted that he did this presentation about a year ago. Pitch canker was first found in California in 1986 and noticed in Swanton Pacific in the 1990's. There is a concern about pitch canker for several reasons. The impacts in California include impacts to native stands and the parent genetic resources found there, impacts to the Christmas tree and nursery industries, a potential threat to commercial species, and urban forestry and the threats to aesthetics and fire hazard. The potential impacts in other parts of the world include timber species in Australia, New Zealand, and Chile. Mr. Yun's project objectives were to establish permanent continuous forest inventory (CFI) plots for monitoring and management, determine pitch canker ratings for all Monterey pines in the CFI plots, and to analyze data for pitch canker disease distribution and its development and/or progression at Swanton Pacific Ranch.

At Swanton Pacific Ranch the total Monterey pine aggregate area is approximately 100 acres or 41 hectares. The Monterey pine aggregate areas occur near top of the slope at rangeland-forest interface. The scope of this project is limited to the Año Nuevo Monterey pine stand at Swanton Pacific Ranch.

The data collection for the project CFI plots included a systematic of 500 feet by 500 feet, with 1/5 acre circular plots (52.7 feet diameter). A pitch canker rating was recorded in 1999, 2000, and 2001 for all Monterey pines within the CFI plots by a variety of people. When determining the systematic 500 feet by 500 feet, once you determine one spot it allows the mapping of all the other spots. The tree location is determined by the bearing and distance from the CFI point, for example N45E33 feet from the CFI point.

The first year they found all the Monterey pines and after which they could map the trees. They plugged it into an excel sheet. Once the bearing and distance are known, the tree can be mapped with the sin and cos. Mr. Yun demonstrated how the location coordinates are determined and the formula for the excel program. He explained that some manipulation had to be done for the different directions. At the end of the calculations the actual x and y coordinates are determined. Then the locations of the trees can be visualized. This has been completed for all the CFI's and they are mapped. Now they can be put in a 3-D map.

Next the pitch canker ratings were put in from no pitch canker, to three degrees of branch infection, to a top kill, to bole canker and finally to death. Mr. Yun demonstrated representations of each type of rating.

Forty-six CFI points were established. Seventeen of the 46 contained Monterey pine. One hundred seventy one Monterey pine are recorded with distance and bearing from their respective CFI points. Each tree was marked with an identification number and the pitch canker ratings were recorded in 1999, 2000, and 2001.

Dr. Yun determined an interval estimation of population proportion with a mathematical calculation. He found that more trees went down in rating than went up in 1999 to 2000 and

2000 to 2001. He thinks that 1999 could have been the stabilizing point in this area for pitch canker disease.

Mr. Yun showed the Task Force overview photos of Swanton Pacific from 1928 through 2005 showing the changes from farm land to grazing to crops and to trees encroaching on the field and now with 7,000 trees planted in the field. He demonstrated the superiority of a 3” resolution photograph and how important it would be to have that capability with pitch canker research.

Mr. Yun stated that GIS can be used with group opening with seedling plots, the same plot can be mapped and you can see how your trees are doing. He noted that the GIS maps were being used in a number of papers since they were done.

In conclusion, Mr. Yun said that CFI plots are established and mapped and the pitch canker ratings are defined. All the Monterey pines in the CFI plots are rated in 1999, 2000, and 2001. He noted again that branch tip infection ratings are decreasing from 1999 to 2001 and that Monterey pines in Swanton Pacific Ranch may not be decimated by pitch canker as was thought in 1999. GIS played significant role in planning and managing the pitch canker project

**Silvicultural Management Strategies for Pitch Canker Infected Año Nuevo Stands of Monterey Pine: Second Year Gap Regeneration Results** Presented by Jason Pinkerton

The primary study object was to determine if different silvicultural methods, namely gap size and site-preparation treatments, improve the survival conditions for naturally regenerating and planted seedlings sourced from 13 open-crossed native parent trees. The second year hypotheses to be tested are whether there is a significant difference between seedling survival based on site-preparation treatment, gap size, and parent tree and if there is a significant difference between seedling growth, namely height and caliper, based on those factors. In addition, analysis on second year post-treatment summaries will include understory species composition, interplanted seedling survival and natural regeneration of tree species.

The method included randomized complete block design with twenty-seven circular group selection plots. Nine plots had opening sizes of 1/8 acre, nine had 1/4 acre opening sizes and nine had 1/2 acre openings. There were three site preparations: lop and scatter, pile and burn and control, with no treatment at all. The plots were randomly located throughout the study area and have no relation to the CFI plots from Mr. Yun’s earlier presentation. Some of the plots overlapped. They were located randomly because of the criteria that were needed for these plots, including tractor loggable ground, no riparian, and surrounded on three sides by trees. For the most part, the plots conformed to those criteria. The reforestation experimental design had 18 planted plots with 10’ by 10’ spacing and 13 open-crossed parent trees in all gaps. A total of 2280 seedlings were planted.

In February of 2003, 673 seedlings had to be replaced. They replaced the dead seedlings with seedlings from the original parents. The interplanted seedling population is the same age as the original seedling population; however, it is treated as a separate population and is excluded from all statistical analysis relating to first year planted seedlings. Some parents were unable to be replicated, so they tried to find the correct seedling to fit that void.

An annual ocular estimate of understory vegetation was done. Each plot is divided into 90-degree subplots, based on the cardinal directions. For each of these subplots, percentages were summed to attain an estimate of overall species cover within each plot. Also, an annual estimate of the natural regeneration of all woody tree species was completed. The survival of planted seedlings was calculated along with a determination of planted seedling growth.

The study found that, at the study area level, the most notable changes in understory vegetation occurred in the proliferation of annual weedy species, namely grasses and thistles not present prior to treatment. Additionally, an increase in overall plant diversity within the study area occurred. The results for the control plots were consistent with the post-treatment year one data, in that little change occurred within the control plots with the exception being the eighth-acre units, because of the introduction of thistle. The pile and burn units continued to change in species composition. Areas largely occupied by bare ground, leaf litter, and poison oak at pre-treatment were altered to include other species, namely grasses, thistles, and burnweed. In half-acre gaps bare ground, leaf litter, and poison oak composition were dramatically reduced. Grass and burnweed became the predominate species occupying these half-acre gaps. Similar results were measured in the lop and scatter site-preparation treatment gaps. Overall species diversity throughout treatment sizes was consistent with pile and burn site-preparation treatment.

Dr. Volger asked about the blackberry and/or poison oak. He stated that it seems as if their response would be the opposite. Mr. Pinkerton stated that many of the burn plots had a lot of grass species coming in. Also quite a few grass species that were native had not been found there for a long time and many understory species didn't come up through the slash.

The natural regeneration results are quantified in several ways, including overall natural regeneration; natural regeneration of hardwoods vs. softwoods; natural regeneration of Monterey pine vs. Douglas-fir; natural regeneration by microsite; and natural regeneration (recruitment) of first year seedlings. All species results from the pre-treatment, post-treatment year one, and post-treatment year two seedling totals for all gaps were 430, 177, and 238 seedlings, respectively. The greatest difference between pre and post-treatment year two seedling counts was measured in the half-acre pile and burn units. There were 137 seedlings prior to treatment and 48 seedlings after treatment. This is double what was recorded in post-treatment year one. Pre-treatment seedling composition was 79% hardwood species and 21% conifer species. Post-treatment year one seedling composition was 78% hardwood and 22% conifer. Alternatively, post-treatment year two seedling composition was 58% hardwood and 42% softwood. The result was an increase in the total number of naturally regenerating softwood seedlings by 20%. A comparison of the two predominate softwood species (Monterey pine, and Douglas-fir) indicated roughly 57% of the pre-treatment recorded softwoods were Monterey pine, 69% of the post-treatment year one softwoods were Monterey pine, and 91% of the post-treatment year two softwoods were Monterey pine. Dr. Volger asked how the Monterey pine predominated, was there a lot of mortality? Mr. Pinkerton stated that it wasn't a matter of mortality, but of a lot of recruitment of Monterey pines and little recruitment of Douglas fir.

Three separate microsities were recognized within each gap opening (inner, middle, and outer). Natural regeneration for all species by microsite for all plots is as follows:

- Pre-treatment, 38% (inner), 37% (middle), and 25% (outer)

- Post-treatment year 1, 25% (inner), 38% (middle), and 37% (outer), and
- Post-treatment year 2, 25% (inner), 29% (middle), and 46% (outer).
- A reversal of natural regeneration has occurred with a majority of recorded regeneration now occurring (post-treatment year 2) in the outer microsite.

Post-treatment year 2 natural regeneration of first year Monterey pine seedlings by microsite is as follows: 13% (inner), 23% (middle), and 64% (outer). Forty-two percent of the overall recruitment occurred in the eighth-acre pile and burn site-preparation treatment.

Chairman Staub asked if there was any distinction between sunshine in the outer band and shade in the inner band. Mr. Pinkerton replied that it was not a factor. Mr. Hawley asked if there was an edge effect. Dr. Mark stated that the data is there to do that type of an analysis, but there is only so much you can do with a Master's thesis. When asked if this data disregards plot size, Mr. Pinkerton stated that it does.

Mr. Pinkerton reported that by the end of year two 988 seedlings had died. Seedling survival rates were the highest in eighth-acre and half-acre pile and burn treatment gaps, results similar to those found by Wise in 2004. Survival percentages were greater for pile and burn site-preparation treatment in all gap sizes when contrasted to lop and scatter site-preparation treatment.

Several significant differences exist between seedlings parents. Seedlings from parent SP15 expressed the lowest odds of survival, 88% less than BC11. The survival of seedlings originating from BC13, BC4, SP15, SP3, SP5, and SP6 were significantly different than BC11. Seedlings survival from parents BC12, BC3, BC6, SP1, SP2, and SP4 were not significantly different than BC11. These levels of significance were identical to those recorded by Wise in 2004. Also, you have to take into consideration animal damage. Every plot was targeted with animal damage.

Regarding interplanted seedling survival, at the end of year one 204 seedlings had died. Seedling survival rate was the highest in quarter-acre pile and burn treatment gaps. Survival percentages were greater for both lop and scatter and pile and burn site-preparation treatments in eighth-acre gap size.

Three factors should be noted at this time: (1) Although the sample size was much smaller, interplanted seedling survival percentages were similar to those recorded at the end of year one original population. (2) We must remember only eight of the original 13 parents could be interplanted. SP15 was one parent absent from interplanting. (3) The amount of interplanted seedlings varied between gap sizes and treatments since planting location and intensity were based upon first year mortality.

When determining the affects on planted seedling height and caliper growth, on average the seedlings grew 15.8 in. (40.1 cm) in height and 0.270 in. (0.686 cm) in caliper. The average seedling growth was the greatest in half-acre gaps and the least in eighth-acre gaps. The greatest average growth between site-preparation treatments were recorded in the pile and burn gaps.

Mr. Pinkerton concluded by stating that the study found that pile and burn site-preparation treatment gaps increase planted seedlings odds for survival. He stated that significant differences among planted seedling survival imply parent tree is a primary consideration when reforesting pitch canker infected stands. Seedlings from parent trees screened as highly susceptible to the pitch canker pathogen have lower odds of survival. He noted that gap size has no significant effect on seedling survival, but that gap size has a significant effect on seedling height and caliper growth. Half-acre gap openings produce trees which are on average larger than those in other gap sizes. Seedling height growth is significantly different between gap site-preparation treatments. Pile and burn gaps produced taller seedlings.

Dr. Volger noted that survival and recruitment is different. He asked if they assessed why some trees did not survive. Mr. Pinkerton noted that they did not measure what killed each particular tree. They don't know that the most pitch canker susceptible trees were killed by pitch canker. He stated that some trees that died had some sort of fungus coming off the top and that he is working with Dr. Gordon and UC Davis to determine the fungus. However, it is inconclusive at this time why the trees died. Chairman Staub stated that he thought he remembered from studies at Davis that it wasn't worth collecting cones from symptomless parents. The fact in Mr. Pinkerton's report that parents are a significant factor is hard to square with what we learned earlier. It is clear from your study that parents are important. Dr. Gordon stated that the study from UC Davis was on heritability, which is different. Cones from parent trees of trees that were susceptible did not grow trees that were more susceptible. Mr. Hawley stated that in the Cambria seed collection there is about 15% resistance from resistant parents. Don Canestro asked how big the plants were when they were planted. Dr. Piirto stated that they were 8 to 12 inches. Mr. Pinkerton stated that they controlled for that in the ANOVA model. The size of each seedling was standardized for each tree. Dr. Piirto asked what they attributed the difference in the earlier results to the results just reported. Mr. Pinkerton stated that in year one they were just trying to establish the trees. Dr. Piirto asked if he thought the gap openings were big enough. Mr. Pinkerton stated that the gap size was appropriate, because this is a management study to help with strict forest practice rules in the County of Santa Cruz and that is why those gap sizes were used. Dr. Piirto asked, from the standpoint of science, could he conclusively state that gap size has an effect on survival. Mr. Pinkerton stated that, based on the data, there is no significant difference in gaps. But if you want big trees fast, it makes a difference. Dr. Piirto noted that a study needs to be undertaken with gap sizes that are larger in order to conclude that in relationship to larger gap sizes. Don Canestro asked if you could look at the natural recruitment in large natural forest areas. Dr. Mark stated that there are pockets of regeneration. Most of that is on the edges of the gaps, but it is not reflected in the gaps in the interior forest. Mr. Pinkerton stated that maybe an acre would be a significant size for growth and survival. He noted that in ten years the real picture is going to be able to be seen.

#### **Update on Pitch Canker Data Base** by Jack Marshall

Jack Marshall noted that several months ago at the Pitch Canker Task Force Meeting at UC Davis they talked about a potential national data base for pitch canker. This stemmed from an internal resolution to pool all the information on pitch canker from California. At this point in time, no one controls of all the data of pitch canker incidence in California – Mr. Marshall, Dr. Gordon, Dr. Mark and Dr. Piirto all have some of the information. There is no an attempt to put all the data together in one location. Mr. Marshall has contract with Tony Quarter from Fort

Collins to come up with a prototype data base entry form for pitch canker. They tried to hammer out a suggestion of a data base form and settled on a prototype. It isn't final by any means and it is not for distribution. Mr. Marshall asked the Task Force to forward any suggestions, changes or omissions. An explanation and discussion of the database prototype followed.

**Project Update: Development of a Protocol for Micropropagation of Pitch Canker Resistant Monterey Pines** Presented by Karen Wells

Ms Wells began by giving a background on Monterey pines, noting that they have a limited native range and are widely planted in parks, golf courses, private lands and plantations outside of the United States. They are ecologically and economically valuable trees that are highly susceptible to pitch canker, which has no cure or effective preventative. It has been found that Pitch canker resistance is possible. From 1999 to 2002, seventy Monterey pines were screened for susceptibility. Of those, 13 were found to be resistant from which genetic clones could be produced. The overall objective of Ms Wells' project is to produce genetic clones of pitch canker resistant Monterey pines by micropropagation for planting throughout California. An additional goal is to develop an effective protocol for using micropropagation to produce genetic clones.

Micropropagation involves plant propagation using cells, tissues or organs in petri plates with hormones and nutrient media in a controlled environment. The plant pieces produce a whole plant with the genetic clones retaining parent characteristics. The micropropagation procedure involves preparation of an agar media, tissue from the plants (e.g. buds), shoot initiation by certain media with certain hormone so cells will start to divide, elongation of shoots formed, multiplication where the plants can be cut apart and produce more plants, rooting induced by hormones and acclimation in the soil.

Specific materials and environmental conditions are necessary to make this work. The media needed includes growth hormone concentration, benzylaminopurine (BAP), agar, and nutrients. The environmental conditions are the pH temperature and light intensity. The plant materials used are seeds buds, and needle fascicles. And precision and quality are critical. As Kathy Horgan in New Zealand noted: "Of course the response to the first cytokinin (hormone) medium can differ from lab to lab with temperature, type of setting agent used, way the medium is autoclaved, dish used for the explant, the local water supply and almost the colour of the operators hair!!"

One of the advantages of micropropagation is the production of clones with desired genetics in a sterile and disease-free environment. It requires less space and plant material than traditional propagation with minimal daily care, rapidly producing new plants in high quantities.

To date, existing protocols have been reviewed. The first trial run was completed in December during which time Ms Wells learned media preparation and sterile techniques and identified areas needing modifications. Future plans for the project include modifying problematic materials and methods, completing another trial this month, varying experimental treatments

such as different light intensities, pH concentrations, and different plant material, and determining which treatments work and which don't.

Mr. Marshall asked about what different plant materials Ms Wells had in mind. She stated that the new plant material will be from Swanton Pacific Ranch. Mr. Hawley asked if she was going to challenge the trees with all known strains or just those around Swanton. Ms Wells stated that she is not going to inoculate them and has not decided what they are going to do about that yet. Dr. Volger asked why she doesn't start first with something that is known to produce Monterey pines. Ms Wells noted that it would be great but that she doesn't have a source. Dr. Volger said that he would be happy to send to send her some.

A discussion followed regarding the protocols that were published in the 1980's which used juveniles. It was suggested by Tom Blush that the juvenility problem was going to kill her. It was noted that Ms Wells is talking with Jennie Akin Christie, who wrote the book on this process. Mr. Blush's second comment was to advise Ms Wells to approach somatic embryogenesis instead of what she is doing. He noted again that the maturation problem is going to kill the project. Enormous amount of effort has been made to do organogenesis and hasn't worked. Mr. Blush stated that Ms Wells will have to deal with one or two year old material, but you can't find one or two year old pitch canker resistant material. Dr. Volger stated that it does work sometimes and that all Ms Wells needs is to find the ones that work. She can do rooting and one of them will take off. Mr. Hawley stated that he has some resistant rootings and he could share one of them with her. Bill Werner stated that he has SP1, 2, 3 and 4. They hopefully will work and she can use that too.

Ms Wells concluded by stating that pitch canker resistant Monterey pines are needed and 13 have been identified. A micropropagation procedure that works must be determined, a written protocol must be developed and then the protocol can be implemented. If this is accomplished, resistant Monterey pines can be supplied to parks, golf courses and private properties. Karen Ferlito brought up the question of these trees being appropriate for native forests. Ms Wells noted that they would not be appropriate, because they are clones. Dr. Volger wondered if you take a clone of a resistant Monterey pine, has anybody seen how the clone behaves – does the resistance stay the same? Mr. Blush stated that there is a light intensity person at the University of Georgia doing interesting work on light quality (spectrum) not quantity and found some dramatic results with that.

**Explaining Unequal First Year Survival Performance in *Pinus radiata* (D.Don) Seed Stock from Chile, New Zealand, and Australia** Presented by Nathan Smith (one of the studies identified in the IMPACT proceedings in 1999)

Mr. Smith noted that the Impact Project had two phases, the Glass House phase which involved the inoculation of seedlings, a separate project in which Bill Werner completed 10,000 inoculations, and the Field Trial which will reach sexual maturity in five years (2009). The goal of the Field Trial was to identify seed stock which are resistant by evaluating their survival. This is being done to confirm the Glass House program. Mr. Smith's role in the project is not to make

assumptions related to resistance at two years, remove extraneous variables if possible, and if not possible, to explain them.

The variables under investigation include testing to determine if seed quality, seed age, or hereditary information can be used to predict or explain inequality of a tree's performance, using the % survivorship from field trial, stratification and sowing as the three tests for performance. Mr. Smith was informed that the seed quality was very variable. This will be a preliminary evaluation, as not all of the preferred testing information is yet available, and will be based on the national origin which does explain some of the differences in seed quality. Dr. Piirto asked if Mr. Smith had seed age by seed lot. Each seed lot should have the date of collection. Mr. Smith noted that he is trying to get that information. They know the information, but he does not have it yet. The different countries are sharing different information

Mr. Smith stated that there are a lot of questions to be answered. He did a preliminary investigation to determine if there was something to investigate and will be getting help to answer some of these questions before any analysis is done on the data.

The percent mortality (dead or missing) of Rep 1 is 35 % mortality from the first year. The percent mortality (dead or missing) in Rep 2 is 57% mortality from the first year. (Rep 2 is in standing water. There is 41% mortality in Rep 3, 40% mortality in Rep 4 and 41% mortality in Rep 5. The survivors are either alive or alive but symptomatic.

In the project there are 22 rows of trees with the locations randomly assigned. The project was laid out well. Mr. Smith showed slides with different charts showing different survival data. Mr. Smith used ANOVA to evaluate if there is a significant difference between the three nationalities in survivorship and performance. It is said that there are significant differences from the sowing or field test but not from stratification. Mr. Smith noted that he was just trying to see what differences there are in the three countries. Size, age and quality were different in different counties according to Mr. Smith's associate. He is also trying to explain why they died in the first year.

Mr. Smith concluded by stating that in the % survival from sowing and % survival from the field trial tests, the three nationalities were significantly different from each other, but that this was not the final test. He noted that there are presumptions to be tested. Mr. Smith wants to determine if seed quality, age, size etc. have an effect. This is implied, as the national origin represents differing seed quality, so the final test should prove to be significant. He wants to determine if trees from the three countries are different. Mr. Smith is waiting for a list of origins from STBA, which will allow him to group based on parent trees. He plans to run a regression on seed quality (dummy regression), seed age, seed size, and hereditary grouping (dummy regression). With that, Mr. Smith will create correction equations which will adjust survival rates, based on seed and hereditary inequalities.

Chairman Staub asked if Mr. Smith was evaluating field conditions as well, with respect to survivorship. Mr. Smith stated that they are all next to each other, and replicated and random (except Rep 2 which is in standing water), so they don't have to deal with that, except maybe the

ones that were actually in standing water. Mr. Werner asked if there were any plans to do branch lesion tests on these. Mr. Smith stated that they have seedlings that were planted adjacent to each other and they know the seed code. They are looking to do that later, but that isn't the project right now. Ms Ferlito asked if they have been provided with funding for the five years Dr. Mark noted that they have provided for five years of the project. Dr. Volger said that if you look at the data from the work Bill Werner did qualitatively you will see that the least susceptible vs. most susceptible is very dramatic; it is about 2-1/2 times. There should be some dramatic differences between family sources if they become inoculated. Mr. Smith agreed but noted that would be after this project. Mr. Marshall stated that you can't just base it on lesion length because the control is different for different trees. Dr. Mark agreed that lesion data is complicated. Dr. Volger asked if there was any correlation with first effort. Mr. Smith stated that they are talking about ranking the performance in the field based on how much they went down in ranking the next year or if they stayed the same. Of course, Mr. Smith noted that they were talking about 5,000 trees, but that is something they would like to do.

Since the Task Force could not tour the site because of the rain, a virtual tour of the site was provided.

### **Discussion of Task Force Mission, Interest Groups, Funding, etc.**

Chairman Staub volunteered to be on a subcommittee formed to frame a discussion of the future of the Task Force. Mr. Hawley also volunteered for the subcommittee. It was noted that there was no fall meeting because of the difficulty in getting date when they could get a quorum. It was agreed that there needs to be a discussion of what the Task Force is doing, its relationship to disease and the arch of the disease. Dr. Frankel noted that Glenn Flamik would enthusiastically volunteer for the subcommittee. Jack Marshall also noted that he could help out. The discussion needs to include whether the Task Force should disband and hand over its responsibility to the Pest Council. If not, the Task Force needs to decide how frequently the Task Force should meet and what should be done at the meetings.

### **Date and Location of Next Meeting**

Dr. Gordon had indicated that the end of March 2007 would be the optimal time for a meeting at UC Davis. Mr. Werner asked Chairman Staub how many people actually are on the Task Force. Chairman Staub noted that the subcommittee will look into Task Force members who have not been attending meetings. Ms Ferlito noted that Dr. Gordon would like a March 2007 meeting, which will be a research meeting and would be very interesting. But it comes at the expense of other issues. Ms Ferlito said that there should be two meetings per year – one that is reporting research and the other for the business of the Task Force. If needed, there could be two research meetings, but there should also be a business meeting. Dr. Piirto agreed and stated that there should be a meeting in early fall.

Dr. Piirto asked if there was a sunset date for the Task Force. Chairman Staub stated that it was left up to the Action Plan process. In the last Action Plan the Task Force agreed to fewer meetings but to continue meeting. Mr. Marshall stated that a sunset date was not addressed. A

termination date is usually upon completing the task. Dr. Piirto noted that the Task Force's task is not done. There is more research to be done, there are more issues, and how to provide for sustainability has not yet been determined. The Task Force has a major role to play for many years to come and Dr. Piirto stated that we need to play that role. Chairman Staub stated that Ms Ferlito's point is well taken. He said that there will be a meeting in September or October. The Task Force will be canvassed by email to see when the meeting will be held. At that meeting, the business aspects of the Task Force can be dealt with and the newly formed subcommittee will have something to report.

Chairman Staub adjourned the meeting adjourned at 3:00 p.m.

### ACTION ITEMS

- ◆ Subcommittee on the future of the Pitch Canker Task Force to meet and begin its discussion for a presentation at the fall PCTF meeting.
- ◆ Schedule a business meeting for September or October 2006.
- ◆ Schedule research meeting at UC Davis for March 2007.